



Volume 2 - Number 12 \* December 1999

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**W**hat if your computer stops working on 1/1/2000? This article offers some suggestions for dealing with the situation.

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**W**e proudly announce EagleMail, a service concept which includes UNT Internet Services E-mail plus a few new features. Read all about it.

[Time to Renew PRAS  
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**I**f you purchased a Premium Remote Access Service subscription for the fall semester -- or had paid through the fall -- and you want to keep it, you will need to renew it. You may also need to take action to ensure the continuation of your UNT Internet Account, under certain circumstances. Details for renewal of both these services are provided in this article..

[Internet Software CD-ROM  
Discontinued](#)

**I**t served a useful purpose at the time, but due to changing technology, sales of the UNT Dial-up Software CD-ROM, "Internet Software Suite

[Online](#)

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*Happy  
Holidays!*



Version 3.0," have been discontinued.

## [Y2K Viruses](#)

There has been quite the dialogue going around about potential Y2K viruses. While many of these 'viruses' cause simple annoying, non-destructive, cute things to happen there are some that could potentially cause lost production time, or worse.

## [Personal Information Online](#)

Think you lead an anonymous life? Think again. This article will help you find out what information is available about you online and how it's gathered.

## [Think Before You Click](#)

A simple click of a button and your thoughts and words can be sent thousands of miles in a matter of a few seconds. But has technology grown so quickly that our means of reasoning have not had time to catch up?

## [Cluster Computing](#)

Cluster computing has become a popular topic in computing environment discussions. Increases in the volume of PCs manufactured have brought about price changes which make clusters of low-cost systems more attractive than single more costly units which have previously been the focus of high performance computing.

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# RSS Matters

By [Dr.Karl Ho](#), Research and Statistical Support Services Manager

**"Study the past, if you would divine the future\*"**

The year of 1999 nears its end. So, what can I write on top of the ubiquitous Y2K issue? In some sense, the Y2K issue really did push us for more developments and move on to new services and applications. In the following I give a retrospective of the changes that occur to our services and an outline to what the future RSS will look like in the new millennium.

## Application support

Software developers worked the hardest this year to roll out new versions of their software. Again, thanks to the Y2K. We have seen SPSS jump from 8.0 to 10.0 and SAS facelift all its software to be Y2K-compliant. As a result, SAS for Windows has moved from 6.12 to 8.0 and S-Plus boosts to version 2000 and 5.0 for Windows and UNIX respectively. Believe it or not, we received the new software mostly in the last quarter of the year. That is, we dealt with 20 different versions of the three software simultaneously!

We have tried our best to present these latest versions of the software available in all major venues including the General Access Labs (GALs), UNIX hosts and the IBM mainframe. While some of the GALs are still using the older version, we will upgrade all the statistical applications to the latest versions during the semester break.

According to the University policy, we have to render all supported software Y2K compliant, which we have mostly achieved earlier this year. Unfortunately, SPSS Inc. has stopped the development of the CMS version of the software and we have to discontinue the support of it. Regarding another version of SPSS on the mainframe, SPSS for MVS, the company sent a patch in early December to render the software "Y2K-enabled" and we did apply the patch as soon as we received it.

Consult our [list of the RSS software compliance](#) if you have any questions on this topic. A list of the latest versions of the RSS software is as follows:

| Software developer | Name             | Latest version |
|--------------------|------------------|----------------|
| SPSS Inc.          | SPSS for Windows | 10.0           |
|                    | SPSS for Mac     | 6.1            |
|                    | SPSS for CMS     | 4.1            |
|                    | SPSS for MVS     | 4              |
|                    |                  |                |

|                                   |                            |                              |
|-----------------------------------|----------------------------|------------------------------|
|                                   | SPSS for UNIX              | 6.1                          |
| SAS Institute                     | SAS for Windows            | 8.0 (TS D1)/<br>6.12 (TS040) |
|                                   | SAS for Mac                | 6.1                          |
|                                   | SAS for CMS                | 6.08 (TS425)                 |
|                                   | SAS for MVS                | 6.09 (TS460)                 |
|                                   | SAS for UNIX               | 6.12 (TS020)/<br>7.0 (TS P1) |
| Conceptual software Inc.          | DBMS/COPY                  | 6.0.5                        |
| QMS                               | Eviews                     | 3.1                          |
| Scientific Software International | LISREL                     | 8.2                          |
|                                   | S-Plus 2000 for<br>Windows | 2000                         |
|                                   | S-Plus for UNIX            | 5.0                          |
| Cardiff                           | Teleform Designer          | 6.1                          |

If you call yourself a mainframe person and are still dubious if you are safe, consult our [Mainframe user Y2K Survival guide](#).

### Teleform Designer 6.1

This year, we also introduced a new application that facilitates questionnaire design and automated data entry. Teleform Designer 6.1 can print out professional, scannable survey forms and significantly helps reduce the turn-around data entry time. We also designed a short course for users who intend to use the Designer for their survey (see [below](#)).

### Student Version of SAS

Last year, we negotiated with SAS Institute and made available a low-priced student version of SAS. We were, however, unable to deliver the new version of the software for students in the fall semester owing to several reasons related to the delay in license renewal. We will release the latest version, 8.0, with two CD-ROMs in spring 2000. The price will be lower than the previous version and the software will be available at the UNT Bookstore. Again, for students only. Faculty and staff members who want to get a copy of the software need to contact our office at the Computing Center.

### Statistical Application Upgrades



In the coming year, we expect to introduce a new monitoring system that ensures all statistical applications (16 of which available for public use) will be upgraded or updated at least once a year with no interruption during the semester. Since SPSS for CMS will be unavailable, we will also begin to provide more support of applications on other platforms such as UNIX, Windows and Mac. Talking about Macs, we recently received a notice from SPSS, Inc. that the company will release SPSS 10.0 for the Mac next year. We will introduce the software for Mac users once it is available. For more details, check the SPSS [press release](#) in this regard.

## Data services

In the year of 1999, we have primarily focused on the data migration from mostly IBM mainframe (e.g. CMS and MVS) to local hosts or UNIX. In particular, we developed programs that transfer data on the old-style round-reel tapes to other platforms such as UNIX. In the coming year, we anticipate some support requests on dealing with the repercussions pertaining to Y2K.

**If you still have data on either CMS or MVS** and you want to move on to other platforms such as Windows or UNIX, you can use FTP to download the files to your local host. For MVS users, you can use IEBGENER to download the data first to CMS and then to other host. See the following link for these procedures:

[How to download files from MVS?](#)  
[How to transfer files from CMS?](#)

Wait, did you say you still have data on those round-reel tapes? Consult our [Mainframe user Y2K Survival guide](#), which provides useful information to deal with mainframe data.

Next year, we will focus more on delivering data via the Web and CD-ROMs. If you like to get research data from ICPSR or any data archives, contact us so we can ready the data for you in one of these media.

## Educational services

The year of Rabbit is also the year of workaholics. Each semester, we provided 13 to 14 courses ranging from SPSS programming to Web survey design. Yes, we have delivered over 40 courses. Despite that these courses are free of charge, it is imperative to bring yourself if you want to go through these intensive training sessions. So, don't just sign your name and we need you to show if you happen to check and register for the class. As for us, we provide the best-equipped lab and computers on campus, course materials and our best instructors. The following lists the courses we have provided:

|   |                                               |
|---|-----------------------------------------------|
| 1 | Computer Tools for Research and Data Analysis |
| 2 | Introduction to SAS                           |
| 3 | SAS Programming Workshop I                    |
| 4 | SAS Programming Workshop II                   |

|    |                                                                              |
|----|------------------------------------------------------------------------------|
| 5  | Mapping Data using SAS and Excel (removed in Fall 1999)                      |
| 6  | Introduction to SPSS                                                         |
| 7  | SPSS Programming Workshop I                                                  |
| 8  | SPSS Programming Workshop II                                                 |
| 9  | Introduction to S-Plus                                                       |
| 10 | S-Plus Programming Workshop I                                                |
| 11 | S-Plus Programming Workshop II                                               |
| 12 | Using Statistical Applications on ACS UNIX Systems (introduced in Fall 1999) |
| 13 | New Technologies for Survey Research I (introduced in Fall 1999)             |
| 14 | New Technologies for Survey Research II (introduced in Fall 1999)            |

To help customers migrate from other platforms to UNIX, we've introduced a new course to train users to use the statistical applications on the Research UNIX system. The course covers the basic information that most current users may not even know when using UNIX. It also focuses on the statistical packages such as SPSS, S-Plus and SAS on UNIX, which are much faster than the Windows versions and have the capability to handle large data sets. On top of that, we introduced a new series called "New Technologies for Survey Research" that provides training for survey researchers in using the new Teleform Designer and designing Web surveys using FrontPage.

In the coming year, we anticipate a proliferation of Web surveys and usage of the Teleform automated survey system. We look forward to developing depository/library of Frontage Web survey codes (HTML) and Teleform survey forms that users can extract from the Web to facilitate the design and composition of surveys.

Okay, long enough. The year 2000 is an exciting year to look forward to and we envision RSS to be an office that provides more and better service in this coming year to help researchers and promote publications. Again, we are eager to hear any comments and suggestions. Have a great Y2K!

\* Lun Yu (The Analects), Confucius

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# Network Connection

By [Dr. Philip Baczewski](#), Associate Director of Academic Computing

## The Ubiquitous Internet

I knew that the Internet was approaching the height of ubiquity when with my plastic Sunday morning newspaper bag, in the special sealed pocket that usually carries a sample of some hair care product or new and improved cereal, there was a CD-ROM for one of the larger Internet service providers. Of course, anyone who has ever indicated to anyone else that they own or use a computer has received an AOL diskette or CD-ROM in the mail. However, a distribution format that occurs randomly throughout neighborhoods, based merely on the premise that people might be able to read, represents a first in the ascendance of the Internet as a staple of American culture.

Such a development is not surprising. It has been reported recently that over 50% of U.S. households have a computer (which includes mine, where there is at least one computer and sometimes two or three for each family member, including the dog). Add the Web TV units which can be had for around the same price as a color TV and devices such as the self-contained e-mail units marketed by such firms as Southwestern Bell, and you realize that the Internet is quickly taking its place beside the numerous other appliances which are absolutely necessary for maintaining the lifestyle to which we have become accustomed.

## Maintaining the Style

This year, the popular media has discovered Internet-based commerce. Spurred by retailers' scrambles to grab every dollar possible in this consumption-powered economy, you see URLs in newspaper ads and flyers. URLs are promoted in TV and radio spots. Some radio stations even have "news shows" devoted to reporting on the Internet, which at close examination, are little more than extended advertisements for Internet commerce sites.

It's ironic that what is being seen in the popular media as the impact of the Internet is really an insignificant extension of a long-standing commercial practice. Internet retailing is just the next century's Sears catalog. You see an item or its description, you can transact commerce, and you can arrange for delivery from a remote location. Wow. It's the 1890s all over again. The only difference today is that if you want to pay a stiff premium, you might be able to cut down on the delivery time, since a jet plane can travel faster than a steam train.

The true impact of the Internet will likely occur through a series of much more subtle developments. The translation of traditional activities to the Internet are useful, but not necessarily significant. It is the increasingly invisible ubiquity of the Internet which will spur significant change in the course of our lives within a technological culture.

## It's the Protocol...

To understand the possibilities of this subtle change, you need to look below the surface and see how the Internet operates. Boil away a whole bunch of the technological broth from the Internet soup, and you are left with a couple of concepts at the bottom of the pot. The Internet consists of various services. Services are each supported by their own protocol. It's the protocols that we know as that Internet alphabet soup: HTTP, FTP, NNTP, SMTP,



IMAP, POP, etc.

An Internet protocol is simply an agreed upon set of methods for communication. The methods are sufficiently specified and sufficiently public so that two different programmers on two different computers can write two different programs that can easily exchange information. It's the easy exchange of information that makes the Internet useful. It's the easy exchange of information that lies at focus of the Internet's potential power to influence change.

## A Defining Concept

A service just came to my attention which is a good illustration of the implications of a protocol. You can find out about it by visiting <http://www.dict.org/>. This is the home site of the Internet dictionary protocol, known as DICT. To quote the RFC (that's alphabet soup for Request for Comment, a document type where protocols are publicly defined), "The Dictionary Server Protocol (DICT) is a TCP transaction based query/response protocol that allows a client to access dictionary definitions from a set of natural language dictionary databases" (see <ftp://ftp.isi.edu/in-notes/rfc2229.txt>).

You might say, "So you can look up words over the Internet... I've got a dictionary in my word processor... what's the big deal?" The big deal is how a protocol supports the transfer of information. It is not limited to an application. It is not limited to an operating system. It is not limited to a particular hardware platform. The dictionary protocol will support the lookup of words from anywhere on the Internet in multiple dictionaries on a dictionary server anywhere on the Internet.

Now, you could argue the epistemological benefits of having a dictionary at all. After all, before there were printed books, educated people were much better at using the long term memory capability of their brains. These days, it takes a written list for most people to buy more than five items at the grocery store. However, the bottom line is that we have placed much of our collective knowledge in books. If you own these books or have a library close at hand, then such a scheme supports your use of intellect fairly well.

The problem comes when you want to access the information from a location that is not a library. I don't know many people who walk around with a copy of the Oxford English Dictionary in their pocket (insert your own Mae West line here). With today's storage technology, it is possible to fit such reference volumes on a device that can fit in your pocket. But even storage technology is limited and requires you to constantly maintain the information to be sure it is up to date. If a dictionary service is available via a dictionary protocol, then you potentially have access to one or many dictionaries anywhere that you have access to the Internet. The dictionary information can be maintained for you and you can use a number of appliances to access that information.

We are just seeing the tip of the Internet ubiquity iceberg. Cellular phones which can double as World Wide Web browsers are now available for purchase. They represent just the beginning of the freeing of the Internet from desktop computers. Maybe dictionaries aren't as interesting to you as they are to me, but the protocol supports any kind of natural language dictionary database. This could include technical terms, programming language references, recipes, part catalogs, etc. Internet protocols provide any information anywhere. That is the power of the Internet to make a real impact on how we live our lives.

## The Bottom Line

I guess there are some who primarily value the Internet for its commercial potential. Call me



an optimist, but I'd like to believe that true value lies in what we can produce, not what we can consume. It is our intellectual products that distinguish us as a species. Technology is a product of intellect. Now, technology supports intellect.

So, you can say I'm not all that excited about being able to buy stuff on the Internet. I get much more excited about arcane topics such as an Internet dictionary protocol. Still, if you are one of those excited about Internet commerce, you will want to investigate my latest product idea, which will make an excellent gift. Coming to a Web site near you, it's an Internet bread slicer. It's the greatest thing since... well, you get the idea.

*Comments, Questions? Send them to [Philip Baczewski](#).*

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# List of the Month

*Each month we highlight one Internet, USENET Special Interest Group (SIG), or similar mailing list or Website.*

## Free newsletters for MS Excel and MS Word

This month, like last month, we are highlighting some free newsletters. [Sandy Burke](#), Computing Center Support Services Manager, thoughtfully submitted these for inclusion in this issue.

- TO RECEIVE ExcelTips regularly via e-mail at no charge, send a blank e-mail to [join-exceltips@lists.lyris.net](mailto:join-exceltips@lists.lyris.net)
- TO RECEIVE WordTips regularly via e-mail at no charge, send a e-mail to [join-wordtips@lists.lyris.net](mailto:join-wordtips@lists.lyris.net)

Web addresses that may be of interest also:

- Vital News Web page - [www.VitalNews.com/](http://www.VitalNews.com/)
- WordTips Web page - [www.VitalNews.com/WordTips/](http://www.VitalNews.com/WordTips/)
- WordTips Premium Web page - [www.VitalNews.com/WordTips/Premium.htm](http://www.VitalNews.com/WordTips/Premium.htm)
- CD-ROM (archive) info - [www.VitalNews.com/WordTips/CDROM.htm](http://www.VitalNews.com/WordTips/CDROM.htm)
- Helpful on-line resources - [www.VitalNews.com/WordTips/Resources.htm](http://www.VitalNews.com/WordTips/Resources.htm)
- WordTips FAQ - [www.VitalNews.com/WordTips/Questions.htm](http://www.VitalNews.com/WordTips/Questions.htm)
- DailyWordTips subscriptions - [www.VitalNews.com/WordTips/Subscribe.htm](http://www.VitalNews.com/WordTips/Subscribe.htm)
- Advertising in WordTips - [www.VitalNews.com//advert.htm](http://www.VitalNews.com//advert.htm)

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Benchmarks  
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We've been talking about the Y2K bug for so long it's hard to believe it hasn't actually occurred yet . It will finally be here in a couple of weeks, though. I sincerely hope that you have a great time this New Year's Eve and no, I don't think the world will end. Anyway if you're worried about your Web browser being Y2K compliant, then this column will answer your concerns.

## Web browsers and Y2K

Web browsers, as far as we know anyway, do not have any Y2K bugs that would render them useless. However, if you visit many SSL encrypted Web sites you could run into an annoyance. This is because on January 1, 2000 the root certificates from Verisign (a company that specializes in issuing SSL certificates which are a critical part of SSL infrastructure & security) will expire. This means most SSL sites (including the GroupWise Web and UNT Internet Account Management system and the forthcoming EagleMail server) will present an error message saying the root certificate has expired. This does not comprise the security of SSL or functionality of the browser in any way.

This is not a bug, it is a security feature. All SSL certificates are set to expire, usually within a year. Root certificates generally have longer lifespans because they are used to sign other certificates. However, they all must expire eventually to limit the amount of damage that could be done if someone "stole" a certificate. Unfortunately Verisign picked a rather bad time to expire their initial root certificates -- January 1, 2000.

## Upgrade your browser

It's easy to fix, however. You simply must upgrade your browser. Thus if you have a Web browser that is below version 4.5 for Netscape or version 5 for IE, you should upgrade to the latest versions of these browsers. Not only will you fix this Y2K annoyance you will also be able to take advantage of the latest in Web development and security. And since both browsers are free, there really isn't a reason not to. I would suggest you do upgrade before Christmas because during Christmas the browser sites\* are always jammed with people who got new computers for Christmas and need to upgrade their browsers.

Happy holidays.

*Mark*

\*For Netscape see: <http://home.netscape.com/try/download/index.html>

For Internet Explorer try: <http://www.microsoft.com/windows/ie/>



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# Short Courses

By [Claudia Lynch](#), *Benchmarks Online Editor*

ACS Short Courses are being finalized for the spring semester. We anticipate classes starting the first week in February. Please consult the [Short Courses](#) page if you would like to find out more about the short courses that ACS typically offers.

## Customized Short Courses

Faculty members can request customized short courses from ACS, geared to their class needs. Other groups can request special courses also. Contact ACS for more information (ISB 119, 565-4068, [lynch@unt.edu](mailto:lynch@unt.edu)).

## Especially for Faculty and Staff Members

In addition to the [ACS Short Courses](#), which are available to students, faculty and staff, staff and faculty members can take courses offered through the [Human Resources](#) Department, the [Center for Distributed Learning](#), and the UNT Libraries' [Multimedia Development Lab](#).

## Center for Distributed Learning

The Center for Distributed Learning offers courses especially for Faculty Members. Topics include Windows 95, PowerPoint, Video Conferencing, and a series of classes concerning putting course materials on the World Wide Web using WebCT®.

The center offers a "Brown Bag" series which meets for lunch the first Thursday of each month at Noon in ISB 204. The purpose of this group is to bring faculty members together to share their experiences with distributed learning. One demonstration will be made at each meeting by a faculty member with experience in distributed learning. Each meeting is followed, for those interested in using WebCT®, by a one hour orientation for beginners in ISB 203. More information on these activities can be found at the [Center for Distributed Learning](#) Web site.

### Special December Training

If you are a faculty or staff member interested in distributed learning, check out the following Videoconferencing and PowerPoint training classes offered by the Center for Distributed Learning:

#### **Videoconferencing**

December 16, 1999  
2:00 p.m. - 5:00 p.m.  
Chilton 245

### **PowerPoint 97**

December 17, 1999

9:00 a.m. - 12:00 p.m.

ESSC 152

You may register online at

<http://www.unt.edu/cdl/VCfall99regisfm.htm>, or contact Kim

Crawford at x2708 if you have any questions.

## **UNT Libraries'**

The UNT Libraries' Multimedia Development Lab has also offered free training to all University of North Texas faculty and staff in the basics of FrontPage 98 and information architecture in the past. For more information visit the Multimedia Development Lab's home page at <http://www.library.unt.edu/mmdl>

## **Technical Training**

Technical Training for campus network managers is available through the Campus-Wide Networks division of the Computing Center. Some of the [seminars](#), such as one on disaster recovery/business continuity planning techniques, may be of interest to others on campus as well.

## **Alternate Forms of Training**

The [Training](#) Web site has all sorts of information about alternate forms of training. Training tapes, Computer Based Training ([CBT](#)) and Web-based training are some of the alternatives offered. There are also handouts for computer training (Microsoft Office 97 and Windows 95) on the following topics:

- GroupWise 5.2 -- Handout for Win95/NT
- FAQ for GroupWise 5.2
- Info on GroupWise for Win3.1
- Computers - Back to the Basics
- Introduction to Windows 95
- Introduction to Word 97
- Advanced Word 97 - MailMerge It Together
- Introduction to Excel 97
- Introduction to PowerPoint 97
- Introduction to Remedy (THE Call-Tracking Program)
- Using Netscape Communicator and the UNT Home Page

This month's ["List of the Month"](#) offers links to free Microsoft Word and Excel information also.

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# IRC News

Minutes provided by Sue Ellen Richey,  
Recording Secretary



**IRC Regular Voting Members:** Judith Adkison, College of Education; Ginny Anderson, Fiscal Affairs; Donna Asher, Administrative Affairs; Sue Byron, Faculty Senate; Carolyn Cunningham, Student Affairs; Jim Curry, Academic Administration; David Griffiths, Student Association; Don Grose, Libraries; Jenny Jopling, Instruction Program Group; Joneel Harris, Administrative Program Group; Elizabeth Hinkle-Turner, Standards & Cooperation Program Group; Allen Livingston, Graduate Student Council; Dan Mauldin, University Planning Council; Ramu Muthiah, School of Community Services, GALMAC; Jon Nelson, College of Music; Robert Nimocks, Director, Information Technology, UNTHSC; Steve Oeffner, UNT Health Science Center; Russ Pensyl, School of Visual Arts; Patrick Pluscht, Distributed Learning Team; Mark Rorvig, Research Program Group; Paul Schlieve, Communications Program Group; Kathleen Swigger, College of Arts and Sciences; Philip Turner, Associate Vice President of Academic Affairs for Distance Education and Dean of the School of Library and Information Resources (Chair, IRC);; Virginia Wheeless, Chancellor; John Windsor, College of Business. **IRC Ex-officio Nonvoting Members:** Leslie Bowden, Telecommunications; Jim Curry, Microcomputer Maintenance Shop; Michael Forster, UNT Health Science Center; Richard Harris, Computing Center; Coy Hoggard, Computing Center; Maurice Leatherbury, Computing Center; Sue Ellen Richey, Computing Center (Recording Secretary). [As of 9/99]

No new IRC minutes were available at publication time. To see past IRC minutes, consult our [back issues](#).

## IRC Meeting Schedule

The [IRC](#) generally meets on the third Tuesday of each month, from 2-4 p.m., in the Administration Building Board Room. Planned exceptions to this schedule are that December meeting was moved to Dec. 14; that the May meeting will be moved to May 9 and the August will meeting be moved to August 8.

All meetings of the IRC, its program groups, and other committees, are open to all faculty, staff, and students.



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# Staff Activities

## Transitions

We welcome the following new employees:

- **Judy Tate**, I/O operator (part-time).
- **Curry Searle**, Computer Support Specialist position on the Desktop/OS team in Network and Communication Services. Also provides desktop [Virus](#) software support.
- **Ron Homann**, Report Distribution Clerk (part-time).
- **Denny Fisher**, Telecommunications Assistant (part-time).
- **Trent Geerdes**, Microcomputer Consultant on CC1/CC2 Network/User Services team in ADM (part-time).

The following people no longer work in the Computing Center:

- **Christian Weimer**, Campus Information Operator (part-time).

## Other Changes

- **Mike Williams** has moved from Production Control to a Computer Support Specialist position on the Desktop/OS team in Network and Communication Services.

## Awards, Recognition

- **Mark Wilcox**, UNT's Web Administrator, was recognized as one of UNT's outstanding employees at the October staff luncheon. Mark was selected by the Chancellor and Vice Presidents for his contributions he's made in regards to the University's Web presence. The award included a monetary reward, a glass statue embossed with the University seal and a photograph of Mark, Dr. Hurley & his wife (signed by Dr. Hurley).
- **Dr. Philip Baczewski**, Associate Director of Academic Computing, was recognized in the October 99 issue of *InHouse* for 15 years of continuous employment at UNT.



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# Campus Computing News

By [Dr. Maurice Leatherbury](#), Senior Director of Academic Computing

## Y2K Rollover Plans

Although we are confident that our systems will survive unscathed, the Computing Center is finalizing its plans to make sure that all of the critical information technology elements on campus are operational following the advent of the new year. Many staff members will be on campus to check on systems when the clock rolls over to the year 2000 at 12:01 on Saturday, January 1 and to begin corrective action if we encounter problems. We expect that many faculty, staff, and students will be trying out our systems shortly after the new year, so here's what you can expect:

- **The mainframe** (both the administrative and academic partitions) will be shut down at 5:00 PM on Friday, December 31st and will be restarted at 1:00 AM on Saturday, January 1. You will not have access to the mainframe during that eight hour period, therefore, and you should expect the reboot to take up to an hour. Full pack backups of both the academic and administrative partitions will be done prior to the shutdown of the mainframe. The shutdown is planned for 5:00 p.m. on Friday, December 31st. Backups for the academic partition will be taken from approximately 11:00 p.m. on Thursday, December 30 until approximately 5:00 p.m. on Friday, December 31. Backups of the administrative partition will be taken from approximately 6:00 a.m. on Friday, December 31 until approximately 5:00 p.m. on Friday, December 31. The individual mainframe partitions will not be accessible while the backups are being taken, and will remain unavailable until approximately 2:00 a.m. on Saturday, January 1, 2000. Messages will be sent to each system (academic and administrative) prior to the actual start time of system backups.
- The Computing Center will have **staff on campus** at 12:01 on January 1st to check the operation of the electrical, water, data communications, and telephone systems. Both on- and off-campus access to our computers will be tested.
- **We will be checking** the operation of the central Web server ([www.unt.edu](http://www.unt.edu)) and our mail systems (GroupWise and the student Internet mail system), starting at 12:01.
- **The Helpdesk** (ISB 119, x2324) will be staffed starting at 7:00 AM on Saturday, January 1 through 6:00 that day, and from 7:45 until approximately 3:00 on Sunday, January 2nd. Questions about the status of systems can be directed to the Helpdesk, which will also serve as a central "sneaker net" communications hub if all forms of electronic messaging are inoperative.
- Computing Center Administrative Computing employees will perform preliminary checks of the **central administrative systems** (Student

Records, Financial Data, Human Resources, etc.) starting at 10:00 on Saturday, January 1st. That afternoon, various end-user departments will have personnel on campus to check those systems for proper functioning.

### Keep in mind ...

It's important to us that our users are aware of steps that they can take to minimize the impact of the Year 2000 rollover on themselves and the campus.\*  
Here is a short list of things to keep in mind:

- Your telephone system at home may be unable to give you a dial tone at 12:01 because everyone will be picking up the handset to see if it's working. So don't assume that the phone system is broken: it just may be overloaded. Wait until after sunrise on Saturday to check your phone!
- As noted above, we'll have staff on campus checking the systems you're going to expect to use when you get back to work on Monday, January 3rd. You can probably wait until Sunday to report any problems you have with getting connected to UNT since it's likely we'll be working on the problem before you notice it.

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\* Other articles on Y2K concerns can be read in this issue. See:

- [Y2K--What if?](#)
- [Y2K Viruses](#)
- [WWW@UNT.EDU](#)
- [RSS Matters](#)

You might also want to take a look at these articles that appeared in last month's *Benchmarks Online*:

- [Y2K — A Minor Hiccup or Major Indigestion?](#)
- [Y2K Links](#)

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# Y2K — What if?

By [Claudia Lynch](#), *Benchmarks Online* Editor

*This article was compiled from a variety of sources. Appropriate credit is given when possible.*

## What if my computer stops working on 1/1/2000?

You meant to get around to it but you just never really checked to make sure your home computer and/or your favorite applications were Y2K compliant. Here's what [Mark Wilcox](#), our Campus Web administrator advises:

1. **Don't panic.** The worst thing you can do is to panic because panic can cause you to make a small problem into a major catastrophe.
2. **First make sure that the problems are actually Y2K related.** If your computer is not starting make sure all of the plugs are plugged in and cables tightened. If it's software related, I would reinstall the software first before changing the date of your machine.
3. [On a PC running Windows] Try to boot into Windows safe mode. Try to change the date from within Windows safe mode and then reboot.\*
4. If you can't get into Windows safe mode, then boot from floppy. Then change the date from the command line with the date command.

**In most cases if you're using a computer that came with Windows 95 or later, you'll be ok** (See the [Microsoft Year 2000 FAQ](#) for more information). At least you should be able to turn your computer on. Even if it doesn't work, a computer can be replaced and/or fixed. The more important things to check out are to make sure you have some food, water and flashlight & radios (and at least a week's supply of prescription medications) on hand. Oh a good backup of your computer never hurts either! And recent printouts of your bank/credit card statements. Don't forget the toilet paper! These things are good to have on hand not just for Y2K but for any emergency (which is why I have stocked up on most of these things). We live in the middle of tornado alley & you never know when a disaster may strike that may leave you without power, water, etc.

## 1972 was a good year ...

Many people have noticed that in terms of the calendar, the years 1972 and 2000 are identical. We can use that to our advantage in many instances. In discussing the things that can go wrong on 1/1/2000, the [Equipped to Survive Website](#) notes:

Many little things we expect to work, won't, or all the functions may no longer work. If it's an electronic device that has a date function and it's more than a few years old, likely the embedded processor will not be Y2K compliant and it may not function as desired. So, you may find yourself replacing VCRs and clocks and similar products.



Note, however, that you can generally make these products function perfectly well and postpone any problems if you simply trick the embedded processor into thinking that the the year 2000 has not yet arrived. Simply set the year to 1972 -- that year is identical to year 2000 as far as dates coinciding with days of the week, throughout the entire leap year. (This solution also works with most computers and **depending upon how you use your computer**, this may be an acceptable short-term alternative to spending money for a new computer or software.)

## What about my Mac?

According to Macnologist.com, "It is generally thought that Macs have no Year 2000 issues to worry about. Let the Macnologist Website be the latest to say this isn't true. While the hardware and operating systems appear to be good to go for the year 2000, not every programmer has programmed their applications to take advantage of the Macs built-in, year 2000 ready, system clock. This problem is perhaps magnified by the fact that there are very few people looking for Mac Y2K problems." Check the [Macnologist Website](#) for links and other information on this topic. At the very least, you ought to be able to start up your Mac on 1/1/2000. You'll have to deal with your applications one by one.

\* Follow these steps to start Windows in Safe mode:

a. Click Start, and then click Shut Down.

b. Click Restart The Computer, and then click OK.

c. If you are using a Microsoft Windows 95-based computer, press the F5 key when you see the "Starting Windows 95" message. If you are using a Windows 98-based computer, when your computer restarts, press down and hold the SHIFT key until Windows 98 starts in Safe mode.

d. When Windows starts in Safe mode, click OK.

e. Choose date/time from the control panel and set the date.

Notes:

In Safe Mode, Windows uses default settings (VGA monitor, no network, Microsoft mouse driver, and the minimum device drivers required to start Windows).

You will not have access to CD-ROM drives, printers, or other devices.

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# Did you get yours?

By [Dr. Philip Baczewski](#), Associate Director of Academic Computing

Academic Computing Services is proud to announce EagleMail. EagleMail is a service concept which includes UNT Internet Services E-mail plus a few new features. ACS has refocused its student E-mail service to better address the needs of students and employees to communicate with each other. EagleMail includes a number of ways to access E-mail and will allow students to receive important University messages which apply directly to them.

For some time now Academic Computing Services staff have been planning for up to 100% participation in the UNT student E-mail system. This is to support a pending policy change which will designate E-mail as an official communication channel from the University to students. The plan was first discussed in the [June meeting](#) of the Information Resources Council and acted upon at the [July meeting](#) of the Council.

One new service of EagleMail is a bulk E-mail system (available Spring, 2000) which provides the ability for selected faculty and administrators to send topical messages to like groups of students at various hierarchical levels (a group could be a single class section or it could be all Freshmen). Another feature is the addition of a Web IMAP client as an option for students to read and send E-mail. This Web client works just like some popular free Internet E-mail sites, like yahoo.com or hotmail.com, but without any commercial advertisements.

In preparation for this new service concept we made an <http://eaglemail.unt.edu/> Website which displays the Web client login screen by default, but also has a help page which provides some basic information about EagleMail. It serves as a focal point for activating an EagleMail account, managing an account, and accessing E-mail. Please visit that page, try out the client, view the "help" page, and provide any feedback you may have. We will be integrating EagleMail into more and more of our support documents as we continue the rollout process.

Our next major effort will be to promote the student E-mail system and develop name recognition for EagleMail. The first step we took was to try to get the EagleMail name percolating out there amongst the student population. This started with advertisements in the NT Daily on December 2 and December 6. The ad in the Daily simply referred people to the EagleMail Website and was the beginnings of our marketing campaign.

The goal of EagleMail is to support better communication on campus. Part of EagleMail is the ability to send information more quickly and accurately by E-mail than by traditional means. Another aspect is to make the E-mail service more useful to and accessible by students. Undoubtedly, as we move our efforts forward, you should be hearing more and more about EagleMail. Remember, it's not just E-mail, it's EagleMail!

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# Time to Renew PRAS Accounts

By [Claudia Lynch](#), *Benchmarks Online* Editor

If you purchased a **Premium Remote Access Service** subscription for the fall semester -- or had paid through the fall -- and you want to keep it, you will need to renew it. You may also need to take action to ensure the continuation of your UNT Internet Account, under certain circumstances. Details for renewal of both these services follows.

## Premium Remote Access Service Renewals\*

Renewals may be purchased in person or over the phone at the software department of the Union Bookstore (940/565 3185). Basic subscriptions for the Spring semester are \$45. ISDN (128K) subscriptions cost \$90.

Subscriptions are also available for the remainder of the school year. For both spring and summer, a basic subscription would cost \$75. An ISDN (128K) subscription would cost \$150 (you must arrange for ISDN service at your home through GTE before you can take advantage of this service)..

These subscription renewals will become active Wednesday, 12 January 2000. **All subscriptions that have not been renewed by Wednesday, 12 January 2000 will be deactivated on Tuesday, 18 January 2000.** Please E-mail any questions regarding renewal to [pras@unt.edu](mailto:pras@unt.edu)

## Internet Service Account Renewals

People who are no longer associated with the University lose their eligibility to have access to many services, including various computing services. If you have been notified that your account is going to be disabled and you are still associated with the University, please contact the Computing Center Helpdesk at (940) 565 2324 or to [helpdesk@unt.edu](mailto:helpdesk@unt.edu). Retirees may continue to have a UNT Internet Service account, however these accounts must be renewed annually. You may be asked to provide documentation of eligibility for this service due to the absence of available data on retirees at this time.

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\*Questions about PRAS? We answered some common ones in our [August 1998](#) PRAS renewal article. The [Remote Access](#) area of the Helpdesk Web site is also chock full of information on that topic.



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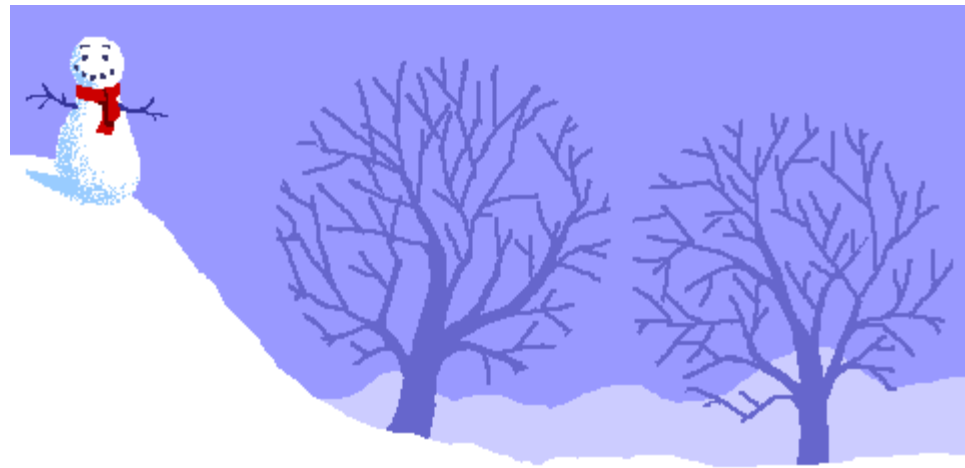
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# Internet Software CD-ROM Discontinued

By [Claudia Lynch](#), *Benchmarks Online* Editor

It served a useful purpose at the time, but due to changing technology, sales of the UNT Dial-up Software CD-ROM, "Internet Software Suite Version 3.0," have been discontinued. Personal computers have become increasingly Internet ready thus negating the necessity of the Computing Center continuing to update and produce the CD-ROM. The Computing Center Support Services [Helpdesk](#) can provide you with any assistance you may need in connecting to the Internet via UNT services or connecting to UNT host computers. You can contact the Helpdesk by calling 940-565-2324, by sending mail to [helpdesk@unt.edu](mailto:helpdesk@unt.edu), or, when you are on campus, dropping by ISB119.



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# Y2K Viruses

By [Curry Searle](#), CWN - Desktop Support & VirusMaster\*

Well, we are about down to the wire on this Y2K thing. It seems there has been quite the dialogue going around about potential Y2K viruses. While many of these 'viruses' cause simple annoying, non-destructive, cute things to happen there are some that could potentially cause lost production time. Check out some of the links below for more detailed information.

The main thing we can do to protect ourselves from these critters is to keep our virus definitions up-to-date. You can find the latest McAfee updates by pointing your favorite Web browser to one of the first two links on the list below.

- <http://www.unt.edu/virus> Download the latest updates licensed for use by the UNT population
- <http://download.mcafee.com/updates/updates.asp> Download the latest updates to your McAfee virus software - FREE download

If you want to read up on these virus threats, you can start with some of these articles:

- [http://www.mcafee.com/centers/y2k/y2k\\_viruses.asp](http://www.mcafee.com/centers/y2k/y2k_viruses.asp) Y2K Viruses and Threats
- [http://dailynews.yahoo.com/h/nm/19991208/tc/tech\\_virus\\_4.html](http://dailynews.yahoo.com/h/nm/19991208/tc/tech_virus_4.html) Wednesday December 8 2:11 AM ET Computer Virus Season Spawns Mutant Strain
- [http://www.cai.com/press/1999/12/ca\\_warns\\_new\\_class\\_virus.htm](http://www.cai.com/press/1999/12/ca_warns_new_class_virus.htm) COMPUTER ASSOCIATES WARNS OF NEW CLASS OF EXTENSIBLE COMPUTER VIRUS Disguised as a Y2K Bug Fix, W95.Babylonia First Worm Virus Controlled by Virus Writer ISLANDIA, N.Y., December 7, 1999
- <http://www.zdnet.com/pcweek/stories/news/0,4153,2403723,00.html> New Mypics worm packs double punch By Lisa M. Bowman, ZDNet News December 3, 1999 3:19 PM ET
- [http://www.cai.com/press/1999/12/emg\\_w32.htm](http://www.cai.com/press/1999/12/emg_w32.htm) COMPUTER ASSOCIATES FIRST TO IDENTIFY Y2K SPECIFIC WORM CA Warns of New W32.MYPICS.WORM ISLANDIA, N.Y., December 3, 1999

\* For those of you not familiar with me, I originally started my UNT tour of duty in the Computing Center back in 1993. I have made my way around the campus working for the College of Business Computer Support Team and also with the College of Arts & Sciences Computer Support Services. I am now back at the Computing Center taking over John Bradley's former position. As you may have guessed from this message I will also be taking over Wil Clark's position as the



VirusMaster for the campus.

Happy Inoculating!

*Curry*

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# Personal Information Online

By [Sharon Marek](#), Web Developer UNT Central Web Support

Many people think that the Internet is somehow different from the real world. That you can shop in secret, and post anonymously -- that there is some kind of privacy associated with being online. But that's not the case. And it shouldn't be, most of the time. You should know what information is available about you, however, and how it's gathered.

Even people that have never visited a Web site or sent an E-mail message have records online. Everything from your home address to your birthday could be available -- to anyone that wants to find it. Try 411.com (<http://www.411.com/>) for phonebook style listings, or WorldPages (<http://www.worldpages.com/>) for listings plus a localized map. This kind of information is readily available offline, so it should be no surprise that it's available online as well.

And I wasn't kidding about the birthday site. A quick search at AnyBirthday.com (<http://www.anybirthday.com/>) should be revealing. Remember, voter registration cards and drivers licenses are public records also, available to anyone that requests them.

Have you ever searched for something online, and noticed, as the search results are displayed, that the ad banner is suddenly relevant? Search for "used cars" on HotBot (<http://www.hotbot.com/>), for instance, and marvel at the coincidence of the resulting ad banner. But it's not a coincidence. It's cookies. Cookies are a marvelous resource - they allow Webmasters to see how people use their sites, making redesigns more relevant. They allow you to buy any number of things online. Cookies facilitate targeted advertising (as in the HotBot example). For many people, this is a good thing. But there are some worrying trends, most particularly, who has access to those cookies? If this is a subject that interests you, check out this [article at Slashdot](#) (motto: "News for Nerds. Stuff That Matters.")

And for those of you that post to newsgroups, the best known Usenet archive, Deja.com (formerly DejaNews <http://www.deja.com>), offers a fairly unique service -- the ability to view author profiles. Every newsgroup posted to from the specified email address will be listed, with the number of posts to each. And you can read those posts in two clicks - one on the newsgroup, one on the subject line. This is something to keep in mind when posting to Usenet. The funny flame you sent as a sophomore might not be so funny when a potential employer reads it. (No kidding! Read all about the possibilities in this [article from Wired](#) online.)

So the Internet, and its component parts, aren't so divorced from the real world after all. Maybe it **would** be a good idea to ["Think Before You Click."](#)

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# Think Before You Click

By [Shane Jester](#), Central Web Support

The Internet has led to the advent of a level of inter-communication unlike any seen throughout the history of mankind. A simple click of a button and your thoughts and words can be sent thousands of miles in a matter of a few seconds. But has technology grown so quickly that our means of reasoning have not had time to catch up? Think about the repercussions of being able to send an E-mail to another person on a whim. Did you really mean to call that person an incoherent idiot or was that just your emotions temporarily taking over? There are lots of things you should consider before sending an E-mail to another person, especially someone you do not know. I'm going to cover two very important concepts concerning this topic.

## Offensive E-Mail

Consider for a moment that you receive an offensive E-mail from another person. The fact that it has offended you means that it has obviously triggered an emotion, usually a negative one. Your first response to the person is likely to be tainted with this emotional trigger. If you were to immediately reply to this message, there is a strong chance that your E-mail would in turn offend the original sender. In a professional setting, this can lead to very poor customer relations. Regardless of the tone of the other individual, you must maintain an emotionally neutral attitude. There are ways of avoiding this trap if you are careful. Your first reaction is to reply to the sender of the original message. However, You must remember that there is no way to take back an E-mail message and it is practically instantaneous. Unlike a written letter, you do not have the time it takes to prepare the envelope and drive to the post office to reconsider the appropriateness of your reply. You should type your response immediately, but do not send the message. Go do something else for a little while and let your emotions subside. After you have calmed down, read the message you typed earlier. You will probably be surprised at the tone of your mail message. You should now be clear-headed enough to make the appropriate corrections to your message so as not to offend your recipient.\*

## Bothersome Questions

A second problem associated with E-mail is also a side-effect of how easy it is to send an E-mail message. The problem is requesting an answer to a simple question without looking for the answer yourself. Although I do not intend to discourage people from sending questions to an administrator of a Web page, I do ask that you think about the question before you send it. Is this a question that has probably been asked frequently? If so, the answer is probably located on the Web page already. Usually, answers like these can be found in the FAQ section of a Web page or in the online documentation. It may take you a minute to find the answer to your question, but it is likely to take less time than it would to get the E-mail returning your answer. It will also diminish the number of questions received by the administrator which could lead to increased response time for the uncommon questions.



There are many other things to consider when sending or replying to E-mail. However, let's just start with these two items for now. Try to practice these rules as much as possible and remember to think before you click.

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\* When surfing the Net it is advisable to observe the rules of Netiquette. According to the [Netiquette](#) Home Page, " 'Netiquette' is network etiquette, the do's and don'ts of online communication. Netiquette covers both common courtesy online and the informal 'rules of the road' of cyberspace."

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# Cluster Computing

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Cluster computing has become a popular topic in computing environment discussions. Increases in the volume of PCs manufactured have brought about price changes which make clusters of low-cost systems more attractive than single more costly units which have previously been the focus of high performance computing. The classic battle between the "army of ants" and the "bull elephant" has shown that at least some types of processing can be more inexpensively implemented using parallel processing with large arrays of PC-class hardware<sup>1</sup>. Where maximizing performance is not the sine qua non, however, another interesting feature of compute clusters comes to the fore.

As PC hardware progresses rapidly to ever more powerful processors, it leaves behind a trail of "mid-life cycle" hardware in the form of last year's models. Often the monitor and special-purpose hardware will be salvaged, but that still leaves a significant chunk of processing equipment looking for a new application. A cluster of these older systems can be configured relatively inexpensively to give adequate performance on certain classes of computing jobs which might otherwise have to be done on the desktop.

Desktop computing systems are designed to place a premium on responsiveness because that measure is most important to the interactive user. In this environment, work is considered compute intensive if it degrades interactive performance, or even if it merely requires a long period to complete (where "long period" is defined by each user on an individual basis). The prospect of moving these non-interactive tasks to another computing platform, either to speed up processing or to minimize the impact on local computing performance, is behind this investigation. The goal of this paper is to document the implementation of a "render-farm" which uses recycled desktop systems to increase the speed of producing an image with a raytracer. This application was chosen because raytracing is a simple problem to adapt to parallel processing. It should be noted that the software problem (programming a parallel solution) is much more demanding in most cases than the implementation of cluster hardware. Nonetheless, it is hoped this discussion will prove interesting and assist in increasing the availability of compute clusters for research purposes.

## Requirements

A cluster obviously requires a group of computer systems connected via a network. In order to make this group of networked PCs look like a single "virtual" machine, an application program interface (api) needs to provide the ability to start processes on other nodes in the cluster and exchange information with them. One such api which is in the public domain is PVM or Parallel Virtual Machine. PVM assumes a single master and multiple slave nodes, where the master distributes work to the slaves. In order to make this cluster accessible from a public network, the master will require two Network Interface Cards (NICs), one configured for the public network and one for the cluster network. It is possible to use the public network for cluster access as well, however

network congestion will degrade the performance of the cluster and the cluster will add to network congestion. The cost of an extra NIC for the master and a hub to connect cluster nodes should be considerably under \$100.00. To maximize performance, high-speed switched network connections can be used, but as cluster price is a prime consideration in this discussion as well as the recycling of older technology, Tbase10 network speeds and a hub will be assumed.

The cluster nodes in this example are running FreeBSD release 3.3<sup>2</sup> and PVM release 3.4.2<sup>3</sup>. PVM has been developed on UNIX platforms but there is a Windows port of PVM 3.4.2. One of the public domain versions of UNIX (Linux or a BSD variant) would seem to meet the cost consideration best. While a 16meg ram node is possible, 32meg is a more useful memory configuration. Disk storage space for the slave nodes is reasonably met by a single 1G drive. It is possible, of course, to get by with about half that space, but the current low cost of disk drives argues for the 1G drives for ease of installation and maintenance. The master node should have adequate disk space to provide users with home directory storage. The master node will also need a monitor, and all the nodes require a keyboard of some sort.

The POV raytracer is a popular public domain application used to generate images from description files. It has been modified to utilize PVM in order to take advantage of the parallelization available on a cluster. This "unofficial" modification is available on the network<sup>4</sup> in source code form. The pvmppov program is the application example used for this cluster, but any PVM-capable program could be used.

## Implementation

As an example, these notes describe an installation with four slave nodes that have 200mhz Pentium MMX processors, and one master with a 166mhz Pentium cpu. All nodes have 32meg of RAM and a Tbase10 network interface, with a second NIC added to the master node. The slave nodes each have a 1G IDE hard disk, while the master node has a 6G IDE hard disk. PVM is installed on all the nodes under /usr/local/pvm3. For PVM applications to work, the source directory and application executables must be available on all nodes *using the same path*. For this reason, home directories are placed in a separate file system on the master node (/home in this case) which is exported to all other nodes. The amd program (BSD's automounter) is used to mount the home directory on a slave node as required. The master node also provides NIS service supplying the password and group files to the cluster as well as the automounter map (/etc/amd.home in this case). Each slave node is an NIS slave which can only bind to the master node. This allows a user to be added to the cluster by making an account on the master, and adding that user to the NIS map files. There is no requirement that the slave nodes have any user-specific information on them, so changing the membership of slave nodes in the cluster is less complicated.

## Installation

The PVM 3.4.2 release compiles without modification on FreeBSD 3.3. The single modification made in this case was to change the remote command used



to start pvmd on slave nodes from rsh to ssh. The FreeBSD.def architecture configuration file can be found in the conf subdirectory if you wish to make this modification. The instructions for building PVM are accurate; it is important to set the environment variable PVM\_ROOT to /usr/local/pvm3 *before* you build the software. Each node should have the system-wide shell configuration files modified so that users have appropriate values for environment variables PVM\_ROOT, PVM\_ARCH and RCMD\_CMD. In addition, the normal user search path should be extended to add the /usr/local/pvm3/bin/FREEBSD and /usr/local/pvm3/lib to the path. The PVM source contains some test programs to verify functionality. You should ensure that PVM is working correctly before proceeding to install pvmpov.

The source code for the pvmpov application is available for Linux<sup>5</sup> and requires a couple of simple modifications to compile on FreeBSD:

1. The Makefile provided needs to be modified to reflect the system-wide installation of software rather than a personal installation. The libz and libpng libraries should be installed as packages or from the ports tree, and their locations corrected in the Makefile. Also, the TCL/TK paths will need to reflect reality on your system. I used TCL/TK 8.0 with no problems.
2. At least one source code module has an "#include features.h" which needs to be changed to "stddef.h".

The instructions for installing this code on a Linux system<sup>6</sup> are a little confusing but essentially correct. On this cluster it was installed under /usr/local/pvmpov. As per the instructions, you will also need to grab the source code for povray 3.1<sup>7</sup>. To propagate pvmpov to the slave nodes after the software is built, tar the entire pvm3 and pvmpov directories and extract them on each slave system.

The process of adding a new user to such a cluster involves these steps:

- add the user to /etc/master.passwd and run pwd\_mkdb -p /etc/passwd
- add the new group to /etc/group
- mkdir /home/<new user> and chown so user owns directory
- cp /usr/local/pvmpov/povrayrc ~<new user>/.povrayrc
- add user to /var/yp/master.passwd
- add user to /etc/amd.home
- cd /var/yp; make to build and push NIS maps
- run amq -f on each node to flush automounter maps

The first three steps are the standard process of adding a new user to the FreeBSD system that is running on the master node. The .povrayrc file contains some reasonable default settings for the raytracer. The final four steps add the user to the NIS database and reload the automounter maps on the slave nodes so they can find the new user's login directory. The process could be "automated" with a perl script to make cluster user management as easy as adding a new user to a UNIX workstation.

## Results

The following table summarizes execution times for a "standard" test file named skyvase.pov. This image contains reflections, texture mapping and anti-aliasing to provide a useful benchmark for comparing systems. The tests are run first on the master node alone, then adding the slave nodes one at a time. As a reminder, the master node is a slower cpu than the slave nodes.

| number of nodes   | time in secs | speed-up factor |
|-------------------|--------------|-----------------|
| master alone      | 576.8        | 1.0             |
| master + 1 slave  | 200.8        | 2.9             |
| master + 2 slaves | 124.2        | 4.6             |
| master + 3 slaves | 93.8         | 6.1             |
| master + 4 slaves | 73.6         | 7.8             |

This informal test shows the performance gains that can be obtained with minimal optimizations for this type of application. The "speed-up factor" is the master alone time divided by the cluster time for each configuration. A database for different types of hardware running this same test is maintained on the net<sup>8</sup>. The image size for the POV benchmark is 640x480 by convention. A more useful size for many applications would be 1024x768. The next table shows the effects of increasing the image size.

| number of nodes   | time in secs | speed-up factor |
|-------------------|--------------|-----------------|
| master alone      | 1217.4       | 1.0             |
| master + 1 slave  | 435.4        | 2.8             |
| master + 2 slaves | 265.6        | 4.6             |
| master + 3 slaves | 193.6        | 6.3             |
| master + 4 slaves | 152.2        | 8.0             |

The 1024x768 version of the skyvase.pov image has a factor of 2.56 times as many pixels as the previous image. The relation between the compute time for any version is slightly more than a factor of 2, which matches well the increase in work load. In addition, there is a slight advantage with the full cluster on the larger job.

## Enhancements

The most obvious enhancement to such a cluster would be to add more or faster nodes. As can be seen from the benchmark figures above, each node added decreases the time to completion, but not by the same factor. This means that at some point adding another node will not decrease the time to completion by a noticeable amount. This point of limited returns is related to the amount of work each node is required to do as compared to the amount of communication with the master involved in assigning the work. The most efficient size for the cluster will depend on the task, the speed of the cluster network, and the speed of the individual systems. The cluster nodes do not have to be the same speed or architecture, but there is increased installation and maintenance overhead if the

architecture varies.

## Future investigations

The goal of documenting this implementation is to encourage investigation of cluster computing on campus. The use of older hardware and public domain software can lead to a relatively inexpensive computation engine capable of significant work in some application areas. Two additional cluster configurations will be investigated as part of this project. The first involves experimenting with process migration from one node to the next using MOSIX<sup>9</sup>. This has possible implications for scalable configurations with large numbers of interactive users. The second is Parallel Virtual File System<sup>10</sup> which uses cluster node disk space to "stripe" the file system across nodes. This has possible implications for applications requiring large amounts of disk storage. Experiences with both of these configurations will be described in papers made available to the community<sup>11</sup>.

## About this document ...

### Cluster Computing

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**latex2html** pvmpov.tex.

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## Endnotes

... hardware<sup>1</sup>

<http://beowulf.gsfc.nasa.gov/>

... 3.3<sup>2</sup>

<http://www.freebsd.org/>

... 3.4.2<sup>3</sup>

[http://www.epm.ornl.gov/pvm/pvm\\_home.html](http://www.epm.ornl.gov/pvm/pvm_home.html)

... network<sup>4</sup>

<http://www.luga.de/~flierl/pvmpov/>

... Linux<sup>5</sup>

<http://www.luga.de/~flierl/pvmpov/>

... system<sup>6</sup>



<http://www.cris.com/~rjbono/html/pondermatic.html>

... 3.1<sup>7</sup>

make extract in the ports area for povray31 will fetch the files and place them in /usr/ports/distfiles/povray31.

... net<sup>8</sup>

<http://www.haveland.com/povbench/>

... MOSIX<sup>9</sup>

<http://www.mosix.org/>

... System<sup>10</sup>

<http://www.parl.clemson.edu/pvfs/>

... community<sup>11</sup>

This document was prepared using the LYX graphical front-end to the TEX text processing system.